ORIGINAL

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	CC Docket No. 96-45
Federal-State Joint Board	)	
on Universal Service	)	

COMMENTS OF ORACLE CORPORATION

Kate McGee
Kenneth J. Glueck
Corporate Affairs Department
Oracle Corporation
http://www.oracle.com/
1667 K Street, N.W., Suite 640
Washington, D.C. 20006
202.467.3794

Glenn B. Manishin
Blumenfeld & Cohen - Technology Law Group
http://www.technologylaw.com/
1615 M Street, N.W.
Suite 700
Washington, DC 20036
202.955.6300

Attorneys for Oracle Corporation

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Oracle Corporation ("Oracle"), by its attorneys, hereby responds to the Commission's public notice ("Notice")[1] soliciting comment on the November 8, 1996 recommended decision of the Federal-State Joint Board on Universal Service ("Joint Board").[2]

INTRODUCTION

As the leading developer of information management software and the world's second-largest software company, Oracle is one of the principal companies driving the rapid development of the Internet for cutting-edge commercial, government and educational applications. Oracle strongly applauds the Joint Board's recommendation to provide America's K-12 schools and libraries with ubiquitous, discounted access to Internet services.

Technology is an increasingly important tool for student success in school, and technological literacy is essential for eventual success in the global marketplace. Universal access to Internet technology will enhance learning by bringing the power of the

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[1] *Common Carrier Bureau Seeks Comment on Universal Service Recommended Decision*, Public Notice, DA-96-1896 (released Nov. 18, 1996)("Notice").

[2] *Federal-State Board on Universal Service*, Recommended Decision, CC Docket No. 96-45, FCC 96J-3 (released Nov. 8, 1996)("Recommended Decision").

global network to the classroom. It will ensure *every* student has access to the best and most recent information and education resources, without regard to the economic status of one's community. And, when fully deployed in the home as well as the school, Internet technology will enhance family support for education by enabling ongoing communication between parents and educators.

In the short period of time since the American political process has embraced the concept of computers in the classroom, the technology itself has moved far beyond the original vision. A few years ago, the computer was a computational tool, limited to use in the math, science, or writing lab. The question educators then faced is can we afford to offer these technological tools to our students. Today, the Internet is fundamentally changing the way students access and analyze information across the globe. Technology has become more than a tool, it is a resource. The question educators now face is can we afford *not* to offer these technological resources to all our students.

Despite near universal acknowledgment of the benefits technology brings to the classroom, deployment in America's K-12 schools has been slow. The cost of hardware and network infrastructure; the lack of educational content and curriculum that can be tailored and integrated into educational programs; physical obstacles in schools and on the desktop; quality training for educators; complexity of the technology; and the sheer magnitude of wiring the schools are all barriers that must be overcome if we are to fully realize the vision of a computer, and Internet access, on every child's desk. Moreover, it is well-recognized that training teachers in effective integration of the Internet and computing technology into the curriculum is perhaps the most important ingredient of this entire mix. Oracle believes the Joint Board's recommendations will lay the

groundwork to overcome some of these obstacles and create, within this decade, an educational environment where every student has the world's information resources at her/his fingertips.

Oracle has been a leader in the area of information technology for nearly 20 years and is the leader in development of an entirely new model of computer network communications, centered on open standards and a scaleable architecture we call "Network Computing." Our vision, simply put, is that a new generation of "information appliances"—ranging from low-cost network computers ("NCs") to Internet-enabled home devices—will truly bring the benefits of network computing to all Americans, not just those with technical competence and economic resources. The network computer—already being deployed by a range of Oracle's partners *and* competitors[3]—is a low-cost, Internet-centric device that holds the potential to radically change the nature of people's interface with technology and information resources.[4] Network computers also have the added benefit of moving the complexity off the desktop, out of the classroom and onto the network server, simple for use in the K-12 environment.

Oracle believes network computing is ideally suited to bring the rich informational resources of the Internet to America's K-12 classrooms and libraries in an easy and cost effective manner. Despite the very substantial size of the Section 254(h)

[3] Neither Oracle Corporation nor its subsidiary, Network Computer, Inc., manufactures network computers or computer networking hardware.

[4] *See generally*, "The Race is On to Simplfy," *BusinessWeek*, Nov. 11,1996; "Battle of the Network Boxesm" *BusinessWeek*, Nov. 18, 1996; "These May Really Be PCs For the Rest of Us," *BusinessWeek*, Nov. 11, 1996; "New Kids On the Block," *Time*, Nov. 11, 1996; "Digital Appliances For the '90s," *PC Magazine*, June 25, 1996; "How Cheap Can Computers Get," *Time*, Jan. 22, 1996; "Network Computing Architecture: An Oracle White Paper" (Sept. 1996) <http://www.oracle.com/nca/html/nca_wp.html>. Additional information on the network computer and NC applications is available at the World Wide Web site of Network Computer, Inc. at <http://www.nc.com>

universal service fund recommended by the Joint Board, it is clear that local school districts will still face sizable challenges in procuring and deploying the hardware, software, teacher training, content and curriculum necessary to make the promise of education technology a reality. Fully deployable network computers for the educational market will sell for around $600.[5] By substantially reducing the average $8,000 cost for acquiring and maintaining a personal computer ("PC")[6]—and significantly reducing administrative and user complexity—the NC model allows more of taxpayers' limited resources to be spent on the parts of education technology that count the most.

Several aspects of the Joint Board's recommendation illustrate the catalyzing role of this proceeding for schools and libraries. First, the Joint Board recommends the Commission provide discounts for Internet access, including both dial-up and dedicated connections, for qualifying educational institutions and public libraries.[7] Second, the *Recommended Decision* concludes that "internal connections" be included as one of the services eligible for discount under Section 254(h)(2) of the Act.[8] Third, the *Recommended Decision* includes "routers, hubs [and] network file servers" among the components of internal connections.[9] These forward-looking and balanced recommendations

[5] The $600 figure represents an estimated 1997 calendar year volume purchase price for a recommended student desktop NC unit, which includes keyboard, mouse and an integrated active-matrix, flat-panel display. Price is dependent upon the actual manufacturer's model, as well as quantities purchased. We estimate home NCs that utilize stanard TVs as the display will sell in the $300 range.

[6] Source: The Gartner Group. The cost of PC ownership and operation is considerably greater than the initial price of the CPU and monitor, as peripheral devices (modems, printers, etc.), software (application and utility software, operating system, etc.) and maintenance (updates, upgrades, servicing, etc.) are all not included in the price of the basic PC hardware setup.

[7] *Recommended Decision*, ¶¶ 462-65.

[8] *Recommended Decision*, ¶ 476-84; *see* 47 U.S.C. § 254(h)(2)

[9] *Recommended Decision*, ¶ 477.

are consistent with developments in the fields of network computing and communications.

There are, however, five specific areas the Commission should clarify in order to achieve the twin objectives of "pervasive technology deployment and use" in schools and libraries,[10] and minimizing the costs of educational technology:

- The Commission should adopt the Joint Board's recommendation for a competitive, market-driven model for the delivery of Internet access to America's K-12 schools and libraries.

- The Commission should implement technological neutrality by encouraging schools and libraries to move beyond the computer and networking technologies reflected in the numerous reports cited by the Joint Board. The Commission should not foreclose, but rather promote, newer, economically efficient, open and interoperable network architectures;

- The Commission should make clear that network file servers, as used for internal connections in K-12 schools and libraries, include file server software required for configuration and support of school/ library local area networks ("LANs");

- The Commission should give schools and libraries the flexibility to adopt whichever client-server technologies best meet their technical and budgetary requirements, whether PC-based, NC-based or some other network architecture;

- The Commission should allow schools and libraries to purchase wireless LANs for internal connections, including both subscription wireless services and wireless CPE, such as NII/SUPERNet and 900 MHz wireless devices.

With these additions, the Joint Board's recommendation will serve as the basis on which America's K-12 classrooms are empowered to meet the informational and communications needs of the 21st century.

[10] *Recommended Decision*, ¶ 458.

I. NETWORK COMPUTING OFFERS A SIMPLE AND EFFICIENT ALTERNATIVE TO PERSONAL COMPUTER-BASED NETWORKS

Almost 20 years after its initial introduction, the personal computer has now become a fixture of American business. The PC's speed and flexibility put immense power and capabilities on the individual desktop. But despite the remarkable growth and continuing price competition of the PC market, the PC's increasing complexity and operating system overhead, combined with application software and hardware expense, have imposed tremendous system administration costs. Personal computers are now out of the financial reach of a majority of American families and educational facilities, evidenced by the fact that only 30% of U.S. households and 5 % of worldwide households have PCs.

There is a second revolution now occurring in the computer industry. The Internet's open and interoperable standards have fundamentally altered information distribution, allowing millions of individual computers ("clients") to quickly and easily access information stored on remote computer hosts ("servers"). With the rise of the Internet, it is no longer clear the PC is the best—or most cost efficient—client to operate in this new environment. The PC-based LAN model is expensive to acquire, difficult to maintain and costly to keep current, primarily due to the need to replicate operating system and end user (employee/student) applications on distributed "islands" of individual PC hard disks.

In contrast, the newer NC paradigm—an open system architecture—allows for software assets (course curricula, software programs, e-mail information, etc.) to be distributed in uniform fashion to a large number of end users from a central location. Network computers are simple to maintain because each device receives all data and

software from a server over the network. And they are efficient to administer because all software backups, upgrades and maintenance are done centrally from the network file server. It is not envisioned that the NC will replace the PC, but the United States has not and can not move into the information age with only 30% of the U.S. population participating.

The World Wide Web and the Internet are rapidly evolving to become the infrastructure for the global economy—both on the public Internet and the large number of corporate Intranets. Oracle has pioneered the development of the Network Computing Architecture ("NCA")—the industry's only end-to-end, cross-platform infrastructure for deploying network-centric applications across the networked economy.

Based on open and *de facto* technical standards,[11] NCA is at the heart of Oracle's vision for a "networked society," one in which every home and business is able to easily, quickly and inexpensively tap the network for the information and applications needed to browse the Internet, send e-mail, and perform typical computing functions such as document creation and spreadsheet analysis. The NCA supports a variety of information appliances—set-top boxes, Web terminals, digital assistants, and the like—that are easy to use and inexpensive to maintain. These appliances will make the tremendous complexities of the Internet as transparent to students as telephone and

[11] NCA is based on CORBA 2.0, HTTP/HTML and Java, open standards for the exchange of information and applications across TCP/IP (Internet) networks. The technology is not proprietary to Oracle or any other company, but instead is based on the same open standards that enable the Internet to operate seamlessly across all different computer operating systems and platforms.

electric utility networks.[12] Because the NCA uses open standards, it can also fully support existing hardware, including PC and Macintosh-based systems.

II. THE NC MODEL PRESENTS A NUMBER OF IMPORTANT ADVANTAGES FOR EDUCATION TECHNOLOGY IN K-12 SCHOOLS AND LIBRARIES

This emerging trend toward a new model for networked computing has important advantages for education technology and for K-12 requirements for Internet access. These advantages can work directly to assist local school administrators overcome the barriers to widespread deployment of education technology identified in the McKinsey & Company report,[13] a resource relied on extensively in the Joint Board's recommendations.

A. Affordability

McKinsey estimated the hardware costs associated with deploying PCs to classrooms at $24 billion initially and $6 billion in annual maintenance expenses. These estimates represent as much as 51% of the total cost of bringing the Internet to K-12 classrooms and assume a 5:1 student:computer ratio.[14] Industry estimates suggest the costs of equipping, supporting and maintaining PCs are as high as $8,000 per machine, per year. By adopting alternative models like the NC, these expenditures can be reduced substantially, allowing schools to deploy desktop NCs at far closer to a 1:1 ratio—nearly a computer for every student—for essentially the same amount of money.

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[12] Some of these NC devices are being developed by Oracle's partners, including RCA, Uniden and others, while some are being developed by Oracle's competitors, including IBM, Microsoft, Sun and Philips Magnavox (WebTV).

[13] *Connecting K-12 Schools to the Information Superhighway*, McKinsey & Company (1996)("McKinsey Report").

[14] McKinsey Report at 28 & Exhibit 7.

B. Longevity

Large investments in soon-to-be-outdated hardware, software and technical standards make little sense in the educational environment. Unlike a PC-based architecture where the applications reside in the machine, the NC model remains "state of the art" for the long term because information and application software are stored centrally on network file servers. This model breaks the never-ending cycle of desktop software updates, system upgrades and desktop maintenance by allowing network administrators to update and upgrade content and applications on the network file server. Desktop hardware investments will last for years.

C. Simplicity

The far lower cost and simplicity of NC-based systems will provide a simpler, more user-friendly environment for schools. The McKinsey Report estimated that systems operation expenses for a classroom computing model would account for 13% of annual operating and maintenance expenses, which is double the estimated ongoing costs of Internet access and *three times the McKinsey estimate for annual internal connection costs.*[15] PC LANs require significant, and duplicative, resources for system administration. Because they are configured with centralized software and communications links, NCs allows K-12 schools and libraries to operate a sophisticated, content-rich network with a minimum of administrative overhead. The network computer puts the complexity of computing back into the network, allowing more time and energy to be spent

[15] *Id.*

on students and education, rather than configuring and maintaining computers and computer networks. Indeed, if the complexity of computing equipment results in more time spent tinkering and less time spent teaching, it is possible to actually *decrease* rather than *increase* educational efficiency. [16]

There is also the issue of *user* complexity. All modern networks—telephone, electric utility, even plumbing—are characterized by extraordinarily simple user interfaces ("UI") and enormously complex network infrastructure. It would be impossible and impractical to expect a user to "boot" a network before placing a phone call, or "configure" a system before plugging in a lamp. In similar fashion, the NC brings the simple user interface to the desktop and moves the complexities of computing to the network—making the technology easier to use, the information simpler to retrieve.

D. Portability

Many models of the network computer access information on central servers through "smart cards." This allows students to move from classroom to classroom—and to the home—with constant access to their personalized data files and Web page. Even better than having a computer on every desk, this model envisions a computer in every shirt pocket.

E. Adaptability

The NC is uniquely suited to solve some of the more mundane— but no less important—costs of incorporating technology in the classroom such as desktop space,

[16] Education technology is not an and in itself, but just a means. If the addition of the Internet and computers to K-12 classrooms requires teachers to spend significant time troubleshooting and maintaining computing equipment, there will be a net loss in the amount of time teachers can devote to instruction and guidance.

electrical power and ergonomic considerations. The NC can be deployed in a wireless setting, avoiding expenses associated with limited power sources or asbestos removal. The NC can also be applied using far less desktop space because NCs are significantly smaller than standard personal computers.

F. Flexibility

Another benefit of Internet access—through the NC model—is the variety of Internet based learning tools available today. One example directly relevant to distance learning is the Oracle Learning Architecture ("OLA"). OLA is an open, Internet-based, online training environment that allows students to access instructional courses anywhere, anytime, and at any pace. OLA can be accessed with any Web browser from any location. The OLA demonstrates that the true power of technology for K-12 is not really on the desktop, but on the Internet.

G. Universality

Due to their high equipment costs, PC LANs have penetrated only the more affluent of most American public school districts. By radically reducing the costs and complexities associated with equipping classrooms for education technology and Internet access, the NC model creates a far more egalitarian distribution of advanced information resources to students, regardless of the wealth of the individual community, avoiding the emergence of a two-class society of information "haves" and "have nots."

* * * * * * * *

All of these advantages support a principal requirement for the rapid deployment of education technology. If we reduce hardware and operating costs to a smaller proportion of K-12 technology budgets, more funds can be devoted to the important

tasks of professional development, teacher training, content production and student utilization. The McKinsey Report indicates that these expenses account for 28% ($13 billion) of the initial costs and 62% ($8.7 billion) of the annual ongoing costs of connecting K-12 schools to the Internet.[17] Based on McKinsey's data, it is apparent that a far greater financial challenge than deploying Internet access and computing equipment to the classroom is that of meeting the need for educational content and expertise in the new domain of a networked society. By adopting the more cost-efficient NC model, local school administrators can earmark more of their limited resources to making technology work for students and less to technology itself.

III. THE COMMISSION'S UNIVERSAL SERVICE DECISION MUST NOT FORECLOSE SCHOOLS AND LIBRARIES FROM ADOPTING AN NC-BASED ARCHITECTURE FOR INTERNET ACCESS

Oracle's vision of a networked society is based on the ubiquitous availability of inexpensive and simple devices that tap the power of the Internet to bring network communications and rich information content within the reach of all Americans. As applied to the K-12 and library environments, the NC model epitomizes the technological neutrality recommended by the Joint Board, in that it is based on open, interoperable and widely implemented Internet standards, with numerous companies competing to deploy the next generation of computing devices.

As discussed by the Joint Board, the principles of "competitive neutrality" and "technological neutrality" are implicit in the congressional command for specific, predictable and nondiscriminatory universal service support mechanisms.

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[17] McKinsey Report at 28 & Exhibit 7.

> The principle of competitive neutrality encompasses the concept of technological neutrality by *allowing the marketplace to direct the development and growth of technology and avoiding endorsement of potentially obsolete services.* In recognizing the concept of technological neutrality, we are not guaranteeing the success of any technology . . . but merely stating that universal service should not be biased toward any particular technologies.

Recommended Decision, ¶ 23 (emphasis supplied). These are vital principles for the Commission to adopt in its final decision in this proceeding, because they will prevent federal universal service support for educational technology from locking in schools and libraries to traditional PC network architectures that are inconsistent with emerging technological and market developments. As the Joint Board emphasized, the Commission should allow "full flexibility" in order to "eliminate the potential impediment that new technologies will not be available to schools and libraries until the Commission has had the opportunity to conduct a proceeding to review evolving technological needs."[18] The Commission should thus "encourage schools and libraries to use both the most efficient services and the most efficient technologies."[19]

A. The Commission Should Adopt the Joint Board's Competitive, Market-Driven Model for Internet Access

Given the staggering pace of innovation in Internet technology and services, Oracle strongly believes the Commission must adopt the Joint Board's competitive, market-driven model for the delivery of Internet access to America's K-12 schools and libraries. A competitive bidding process places appropriate responsibility for equipment, service and other technology decisions in the hands of the people best-suited to develop efficient, cost-effective plans for Internet access. The FCC plainly

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[18] *Recommended Decision*, ¶ 461.
[19] *Id.*

must assure that the $2.25 billion the Joint Board has allocated for advanced telecommunications services for K-12 schools and libraries is efficiently spent, but should not place any rigid or artificial limitations on the network architectures or technologies implemented by local educators.[20]

B. The FCC Should Encourage the Deployment of New Computing Models

While Oracle envisions the NCA as the next wave of computing and communications, we believe the success of this technology must be left to the marketplace. Accordingly, Oracle does not recommend that the Commission extend the scope of its Section 254(h) subsidies to the desktop—whether outfitted with a traditional PC, a newer NC, or a mix of both. On the other hand, it is essential that the Commission's final universal service decision not preclude—rather encourage—K-12 schools and libraries from adopting a network computing model for their computer networks and internal connections. Economic efficiency and competitive and technological neutrality, key aspects of Congress' mandate and the Joint Board's recommendation, require that the Commission give schools and libraries the flexibility to configure their hardware and networks in the most technically advanced and cost-effective manner possible.

C. Network File Servers Should Include Server Software

The *Recommended Decision* includes "routers, hubs [and] network file servers" among the components of internal connections eligible for subsidy under Section 2564(h)(2) of the Act.[21] The Joint Board foresees that companies other than telecommunications carriers will be in a position to qualify for providing discounted network file

[20] *Recommended Decision*, ¶ 23.
[21] *Recommended Decision*, ¶ 477.

servers to K-12 schools and libraries, recommending that the Commission extend universal service support "to any provider of internal connections that the school or library selects."[22] This is clearly necessary, as server hardware is available from scores of computer equipment manufacturers that provide no telecommunications services.

Less clear is whether the Joint Board's recommendations would include file server software within the scope of internal connections qualifying for the federal universal service fund. Oracle believes there is little question that network file servers must also include the software that is essential to operate the K-12 and library computer networks used for Internet access. Students and library patrons will simply be unable to use a LAN for purposes of Internet access unless individual computer workstations can communicate with the network server. As the *Recommended Decision* recognizes, schools can implement Internet access arrangements through either dedicated (leased) or dial-up connections; all of the former (and many of the latter, for instance shared ISDN lines) will be routed through a network file server.[23] And as a practical matter, most server hardware available today is sold bundled with the necessary software, configuration files and communications protocol support to enable intra-network and network-to-Internet communication.

Just as the *Recommended Decision* concludes that the Commission should not disaggregate Internet access between its transport and information components,[24] the

[22] *Id.* ¶ 484.
[23] *Recommended Decision,* ¶ 463.
[24] *Recommended Decision,* ¶ 463.

Commission should not attempt to disaggregate network file server hardware and software. Neither is a workable product without the other, and both are needed to make intra-school and intra-library connections work for purposes of both basic computer networking and Internet access. The Commission's final decision in this proceeding should therefore clarify that "network file servers" eligible for support under Section 252(h)(2) include file server software used to configure, operate and manage computer network communications.

D. Schools and Libraries Should Have Flexibility to Adopt NC-Based Solutions

Although their name includes the word "computer," NCs are much closer to communications devices than current personal computers. Indeed, because the principal function of NCs will be to access, via the Internet, information and software stored remotely, extending the federal universal service fund to cover NCs could, from a policy perspective, be an important part of ensuring universal availability of Internet access for America's schools and libraries. Yet it would be impossible to harmonize the 1996 Act's legal requirements, and specifically its charter for the Commission to enhance "access to advanced telecommunications and information services,"[25] with the expenditure of federal universal service funds for desktop computing hardware. Oracle is consequently not suggesting that universal service support for internal connections be extended to NCs, rather than PCs. We do not propose that the Commission test the limits of its universal service jurisdiction and jeopardize the more

[25] 47 U.S.C. § 254(h)(2).

fundamental principle that computer network equipment used for internal connections qualifies for universal service support.

At the same time, Oracle firmly believes the Commission must take steps to ensure competitive and technological neutrality in its decision on internal connections. If the FCC were to limit federal discounts to the network equipment used with today's PCs, it is possible that K-12 schools and libraries would be unable to implement NC-based networks and realize the tremendous cost savings associated with this new technology. Again, the Joint Board's recommendations on Internet access are illuminating, in that the *Recommended Decision* seeks to ensure "that schools and libraries will be afforded the flexibility they may need to procure whatever Internet access arrangements they determine to be most cost-effective."[26] For internal connections, the Commission's decisions must give schools and libraries similar flexibility, permitting them to adopt whichever client-server architecture that they decide is most cost-effective.

What this means, in practical terms, is the Commission should ensure technological neutrality by avoiding any limitation on the type and size of network file servers, routers and similar network technologies K-12 schools and libraries are permitted to deploy using universal service support funds. Just as the choice of bandwidth (*i.e.*, dial-up, 56 Kbps, T-1, etc.) will be made by schools and libraries based on their unique informational and technical requirements, choice of computer network architecture (PC

[26] *Recommended Decision*, ¶ 462.

LAN, NC network, etc.) should not be dictated by the Commission. These determinations should be made by the marketplace and the competitive bidding process for K-12 and library internal connections, not in the Commission's universal service regulations. Given the many different technical features of computer networks, from student:computer ratios to telecommunications capacity to file server software configurations, any other approach would effectively be an "endorsement of potentially obsolete services" by biasing universal service support mechanisms toward the 1980s-era PC-based network technologies.[27] The Commission should permit schools and libraries to adopt whichever client-server architecture best meets their technical and budgetary requirements, whether PC-based, NC-based or some other network architecture.

E. Wireless LAN Equipment Should be Eligible for Universal Service Support

Wireless networks are an important part of the technology solution for internal connections in school and libraries. The "hidden costs" of connecting classrooms in older buildings—including asbestos removal and electrical improvements—can often make a wired network dangerous, expensive or fiscally impossible. As the McKinsey Report concluded, wireless networks are frequently "the more efficient alternative" for external connections between the school and its ISP.[28]

The *Recommended Decision* discusses wireless networks in two instances. First, the Joint Board points out that schools can purchase "wireless services" for internal

[27] *Recommended Decision*, ¶ 23.
[28] McKinsey Report, at 58; *see Recommended Decision*, ¶ 482.

networking purposes.[29] Second, the *Recommended Decision* specifically includes "wireless LANs" as items encompassed within the scope of internal connections for Section 254(h) purposes.[30] It is not clear from these short references whether the Joint Board intended wireless networking equipment, as distinct from subscription wireless services, be eligible for discount when used for internal connections.

Oracle believes the Commission should maintain technological neutrality with regard to wireless issues, favoring neither wireless service providers nor manufacturers of wireless networking equipment. Many existing cellular, PCS and data service providers offer wireless Internet access services. Additionally, a large number of equipment manufacturers, including 900 MHz devices, Part 15 equipment and soon NII/SUPERNet devices,[31] all offer options for use in wireless K-12 and library applications. The principal sponsors of Section 254(h) have advised the Commission of their desire was to have the universal service fund cover internal connections "in ways that are technologically neutral."[32] The best way to implement this principle is for the Commission to clarify that "wireless LANs" used for internal school connections include both wireless equipment and wireless services. As should be the case for all technology decisions in this area, the choice of wireless alternatives should be left to the schools and libraries themselves.

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[29] *Recommended Decision*, ¶ 482.

[30] *Recommended Decision*, ¶ 477.

[31] *See Amendment of the Commission's Rules to Provide for Unlicensed NII/SUPERNet Operations in the 5 GHz Frequency Range*, Notice of Proposed Rulemaking, ET Docket No. 96-102 (released May 6, 1996).

[32] *Recommended Decision*, ¶ 481.

CONCLUSION

In the end, this proceeding is about educating children, not about technology. The FCC has the opportunity in this proceeding to lay the groundwork for every student, regardless of income, school size, or physical location has access to the global network and the best available educational curriculum, thus improving the educational experience of every child. The Commission should be bold in its vision, making clear that K-12 schools and libraries have the flexibility to implement Internet access arrangements and computer network architectures in ways that meet their technological and budgetary needs. Oracle believes its model for an open, interoperable Network Computing Architecture is ideal for making educational technology and Internet access, fast, affordable and simple. The Commission's commitment to competitive and technological neutrality must be open to the NCA, while leaving the ultimate decisions on whether to adopt this technology to consumers, schools and libraries—and the marketplace itself.

Respectfully submitted,

By: _____
Glenn B. Manishin
Blumenfeld & Cohen - Technology Law Group
http://www.technologylaw.com/
1615 M Street, N.W.
Suite 700
Washington, DC 20036
202.955.6300

Kate McGee
Kenneth J. Glueck
Corporate Affairs Department
Oracle Corporation
http://www.oracle.com/
1667 K Street, N.W., Suite 640
Washington, D.C. 20006
202.467.3794

Attorneys for Oracle Corporation

Dated: December 19, 1996.

CERTIFICATE OF SERVICE

I, Cindy Miller, do hereby certify on this 19th day of December, 1996, that I have served a copy of the foregoing document via first class mail, postage prepaid, to the parties below:

Cindy Miller

The Honorable Reed E. Hundt
Chairman
Federal Communications Commission
1919 M Street, N.W. - Room 814
Washington, D.C. 20554

The Honorable Rachel B. Chong
Commissioner
Federal Communications Commission
1919 M Street, N.W. - Room 844
Washington, D.C. 20554

The Honorable Susan Ness
Commissioner
Federal Communications Commission
1919 M Street, N.W. - Room 832
Washington, D.C. 20554

The Honorable Julia Johnson
Commissioner
Florida Public Service Commission
2540 Shumard Oak Blvd.
Gerald Gunter Building
Tallahassee, FL 32399-0850

The Honorable Kenneth McClure
Commissioner
Missouri Public Service Commission
301 W. High Street, Suite 530
Jefferson City, MO 65101

The Honorable Sharon L. Nelson
Chariman
Washington Utilities and Transportation Commission
PO Box 47250
Olympia, WA 98504-7250

The Honorable Laska Schoenfelder
Commissioner
South Dakota Public Utilities Commission
State Capitol, 500 E. Capitol Street
Pierre, SD 57501-5070

Martha S. Hogerty
Public Counsel for the State of Missouri
PO Box 7800
Jefferson City, MO 65102

Paul E. Pederson, State Staff Chair
Missouri Public Service Commission
PO Box 360
Jefferson City, MO 65102

Lisa Boehley
Federal Communications Commission
2100 M Street, NW, Room 8605
Washington, DC 20554

Charles Bolle
South Dakota Public Utilities Commission
State Capitol, 500 E. Capitol Street
Pierre, SD 57501-5070

Deonne Bruning
Nebraska Public Service Commission
300 The Atrium
1200 N Street, PO Box 94927
Lincoln, NE 68509-4927

James Casserly
Federal Communications Commission
Office of Commissioner Ness
1919 M Street, NW, Room 832
Washington, DC 20554

John Clark
Federal Communications Commission
2100 M Street, NW, Room 8619
Washington, DC 20554

Bryan Clopton
Federal Communications Commission
2100 M Street, NW, Room 8615
Washington, DC 20554

Irene Flannery
Federal Communications Commission
2100 M Street, NW, Room 8922
Washington, DC 20554

Daniel Gonzalez
Federal Communication Commission
Office of Commissioner Chong
1919 M Street, NW, Room 844
Washington, DC 20554

Emily Hoffnar
Federal Communications Commission
2100 M Street, NW, Room 8623
Washington, DC 20554

L. Charles Keller
Federal Communications Commission
2100 M Street, NW, Room 8918
Washington, DC 20554

Lori Kenyon
Alaska Public Utilities Commission
1016 West Sixth Avenue, Suite 400
Anchorage, AK 99501

David Krech
Federal Communications Commission
2025 M Street, NW, Room 7130
Washington, DC 20554

Debra M. Kriete
Pennsylvania Public Utilities Commission
PO Box 3265
Harrisburg, PA 17105-3265

Diane Law
Federal Communications Commission
2100 M Street, NW, Room 8920
Washington, DC 20554

Mark Long
Florida Public Service Commission
2540 Shumard Oak Blvd.
Gerald Gunter Building
Tallahassee, FL 32399

Robert Loube
Federal Communications Commission
2100 M Street, NW, Room 8914
Washington, DC 20554

Samuel Loudenslager
Arkansas Public Service Commission
PO Box 400
Little Rock, AR 72203-0400

Sandra Makeeff
Iowa Utilities Board
Lucas State Office Building
Des Moines, IA 50319

Philip F. McClelland
Pennsylvania Office of Consumer Advocate
1425 Strawberry Square
Harrisburg, PA 17120

Michael A. McRae
DC Office of the People's Counsel
1133 15th Street, NW, Suite 500
Washington, DC 20005

Tejal Mehta
Federal Communications Commission
2100 M Street, NW, Room 8625
Washington, DC 20554

Terry Monroe
New York Public Service Commission
3 Empire Plaza
Albany, NY 12223

John Morabito
Deputy Division Chief, Accounting and Audits
Federal Communications Commission
2000 L Street, NW, Suite 812
Washington, DC 20554

Mark Nadel
Federal Communications Commission
2100 M Street, NW, Room 8916
Washington, DC 20554

John Nakahata
Federal Communications Commission
Office of the Chairman
1919 M Street, NW, Room 814
Washington, DC 20554

Lee Palagyi
Washington Utilities and Transportation Commission
1300 South Evergreen Park Drive, SW
Olympia, WA 98504

Kimberly Parker
Federal Communications Commission
2100 M Street, NW, Room 8609
Washington, DC 20554

Barry Payne
Indiana Office of the Consumer Counsel
100 North Senate Ave., Room N501
Indianapolis, IN 46204-2208

Jeanine Poltronieri
Federal Communications Commission
2100 M Street, NW, Room 8924
Washington, DC 20554

James Bradford Ramsay
National Association of Regulatory Utility Commissioners
PO Box 684
Washington, DC 20044-0684

Brian Roberts
California Public Utilities Commission
505 Van Ness Avenue
San Francisco, CA 94102

Gary Seigel
Federal Communications Commission
2000 L Street, NW, Suite 812
Washington, DC 20554

Richard Smith
Federal Communications Commission
2100 M Street, NW, Room 8605
Washington, DC 20554

Pamela Szymczak
Federal Communications Commission
2100 M Street, NW, Room 8912
Washington, DC 20554

Lori Wright
Federal Communications Commission
2100 M Street, NW, Room 8603
Washington, DC 20054